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ABSTRACT

This pilot study examined variables that could influence attitudes toward learning and working with computers of preservice teachers at the beginning and end of an introduction to educational technology computer course taught at the University of Central Florida's College of Education during Summer 1997. The variables examined in the study were computer attitudes (computer anxiety, computer confidence, computer liking, and computer usefulness) and student perceptions. Twenty-six students enrolled in the course completed the Computer Attitude Scale (CAS) pretest and posttest. The basic curriculum and course issues that were considered to be fundamental to the overall success of the course were curriculum issues, high impact and low threat, classroom issues and design, and continuous emphasis on key basic skills. Findings indicated that, after completion of the course, students had less anxiety and a more positive attitude toward technology. (AEF)

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Teaching Pre-service Teachers Technology: An Innovative Approach

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As technology has quickly been changing and revolutionizing the computer industry, education and educators have continued to have difficulty embracing the technology with open arms. Along with the availability and expanded capabilities of the computer and related technologies in the classroom, student attitudes toward computers remain a barrier in the learning process of technology (Clawson, 1996; Gunter, 1994; Gunter & Murphy, 1995).

Research has shown that a pre-service teacher's initial attitude toward technology may either positively or negatively impact their future use of educational technology in the classroom (Reznich, 1996). Faculty should be knowledgeable of the factors that could cause students to exhibit behavioral characteristics such as: computer anxiety, computer confidence, computer liking, and computer usefulness.

Faculty must understand that one of the strongest impacts on the educational process is that students' attitudes affect their process of learning. Educators must reevaluate their educational focus, thus leaning toward the use of technology with positive experiences for pre-service teachers (Clawson, 1996). Every effort to assure pre-service teachers' initial exposure to educational technology is positive and motivational should be made. Educators need to strive to light a fire and motivate pre-service teachers to understand the influence educational technology can have in their lives and classrooms.

A report published in 1997 by the National Council for Accreditation of Teacher Education (NCATE) titled *Technology and the New Professional Teacher - Preparing for the 21st Century Classroom*, stated "The nation's teacher education institutions must close the teaching and learning technology gap between where we are and where we need to be. Teacher education institutions must prepare their students to teach in tomorrow's classrooms (p i)."

The majority of pre-service teachers continue to enter institutions of higher learning lacking the positive attitudes, proper skills, and knowledge in the use of computers. All pre-service teachers should be competent in computer related skills. Students should be provided with the skills that will enhance their abilities to not only compete in a global economy, but survive well into the 21st century. To date, many institutions of higher education have failed to properly prepare pre-service teachers with positive experiences while learning the required technological skills. Furthermore, students have not been provided with insight into the potential educational technology can have on public education.

The federal government is investing $2.25 billion a year to provide high speed Internet access in all K-12 classrooms. By the year 2000, many K-12 classrooms will have access to the Internet. It is essential that Colleges and Schools of Education instruct pre-service teachers how to integrate the vast resources of the World Wide Web and related technologies into their classroom curricula. In addition, teachers need to understand the teaching processes that can be enhanced by using the computer and acquire evaluation skills for determining when to use the computer. Pre-service teachers need to learn how to assess the effectiveness of the computer when it is used in the instructional scheme. Institutions of higher education must develop motivational strategies to provide pre-service teachers with these evaluation skills.

Purpose of the Study

The purpose of this pilot study was to examine variables that could possibly influence attitudes toward learning and working with computers of College of Education pre-service teachers at the beginning and end of an introduction to educational technology computer course taught at the University of Central Florida during Summer 1997. The course used for this research was EME 1040, Technology for Educators. The variables examined in this study were computer attitudes and student perceptions. For purposes of this study, computer attitudes are identified as computer anxiety, computer confidence, computer liking, and computer usefulness (Gunter, 1994; Henderson, Deane, Barrelle, & Mahar, 1995; Loyd & Gressard, 1984).

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The introduction to educational technology course was redesigned to incorporate innovative strategies for teaching pre-service teachers to use technology, teach with the technology, and find creative ways to help pre-service teachers to integrate technology into the curricula of their future classrooms. The researcher wanted to determine if these strategies could make a difference in pre-service teachers' attitudes toward technology after completion of the course.

Methodology and Instrumentation

The research design for this study was causalcomparative. Due to the nature of classrooms with intact groups, the causalcomparative method was used. Causes are studied after they have already exerted their effect on a variable. Otherwise known as ex post facto research, the causalcomparative method was utilized to explore the relationships among variables. Statistical tests used were t-tests and they were considered significant at the .05 level.

The instrument used for this pilot study was the Computer Attitude Scale (CAS) developed by Gressard and Loyd (1985). The CAS is a 40item instrument that is divided into four, 10item subscales: Computer Anxiety, Computer Confidence, Computer Liking, and Computer Usefulness.

The CAS has been successfully used with 7th12th grade students, college students, teachers, and administrators. To explore functional use of the CAS, Loyd and Gressard (1985) and Loyd and Loyd (1985) ran a study that indicated the CAS is reliable and valid for measuring attitudes. The coefficient alpha reliabilities were .89, .89, .89, and .95 for Computer Anxiety, Computer Liking, Computer Confidence, and the Computer Usefulness Subscales, respectively. A factor analysis revealed the subscales were sufficiently stable and the instrument could be used confidently and effectively in research and program assessment. The CAS has been tested through many studies to determine the stability of the CAS and subscales to determine their effectiveness in reflecting change in computer attitudes as a result of computer instruction and experience. The CAS was found to be sensitive to attitude changes resulting from computer instruction and experience.

Description of Sample

The sample for this pilot study were students enrolled in an introduction to educational technology course, EME 1040 Technology for Educators taught in the College of Education at University of Central Florida during Summer 1997. The sample utilized in this study were those students who completed both the CAS pretest and posttest. Twenty-nine students completed the pretest with posttest being completed by 26 students. After completion of the posttest, 26 students were matched by pretest to posttest. Therefore, the sample of students for this pilot study was 26. The sample consisted of 21 females and 5 male students of ages ranged from 19 to 46 with 76% being 26 years or younger. Twenty of the students in the pilot sample had attended a community college prior to entering the University of Central Florida. Eighty-nine percent of the students stated they had primarily learned technology on their own. Sixty-one percent had access to a home computer.

Description of the Course

Knowing that students enter the classroom with predetermined attitudes toward technology, faculty created innovative teaching techniques that were demanding but not threatening. Techniques and strategies were developed that created an environment for students that made learning technology not only relevant to the real world, but also fun.

Learners need to learn to use technology in a non-threatening environment. In order for students to embrace technology, they need authentic hands-on exercises, time, access, support, and resources to acquire ability through experience. Therefore, a major focus of the course was to provide opportunities for students to not only learn to use the technology but also learn to teach with technology.

The following is a summary of the basic curriculum and course issues that were considered fundamental to the overall success of the course.

Curriculum Issues. The course curriculum was completely redesigned prior to the start of the semester and was based upon state requirements, instructor experience, and formal inputs from regional K-12 teachers, K-12 technology coordinators, K-12 administrators, and College of Education faculty. During the first class session, each student was required to complete a detailed computer skills questionnaire that covered over 35 specific computer and educational technology skills. The course curriculum was modified after the first class session based upon the identified students' skill levels. The curriculum was also continually updated as the semester progressed based upon student performance, student comprehension, and new educational technologies. Traditional software tutorials were not used. Whenever possible, introduction and practice of software programs were immediately followed by practical application of the software in an educational setting. Integration of technology into K-12 classroom curricula was emphasized throughout the course.

High Impact and Low Threat. The course was considered by faculty to be a high impact class because hundreds of different specific educational technology and basic computing topics were covered. In addition, students were introduced to dozens of different software programs and the educational resources of the World Wide Web. All course activities and requirements were designed to be motivational and to empower pre-service teachers to use technology while at the same time creating positive experiences for all students. Traditional testing was not used. Instead, on-time and mandatory class attendance, hands-on exercises, out-of-class education related projects,

textbook reflections, and in-class presentations assumed the same role as traditional testing. Because of faculty emphasis of on-time class attendance, the average weekly attendance was over 97%.

Classroom Issues and Design. The course met once a week during the semester. Most class sessions were structured with approximately 40% non-traditional lecture format and 60% hands-on in a non-traditional computer lab. The lecture portion was considered non-traditional because all lectures were conducted in a modern multimedia classroom with a large screen projection system. Instructor created multimedia presentations were used for all lectures. In addition, the instructor continuously modeled educational and other technologies during teaching. The lectures included instruction on required traditional computer concepts, computer hardware, basic software programs, and dozens of educational implications of technology.

The computer labs were considered non-traditional for three reasons. First, all hands-on computer and software concepts practiced in the computer lab were first demonstrated by the instructor using the multimedia presentation system during the lecture portion of the classes. Second, all hands-on lab sessions were part of the scheduled class time and immediately followed the lecture portion of each class. As a result, new software concepts were still fresh on the minds of the students. Third, the course instructor was present and instructed during all lab sessions.

Continuous Emphasis on Key Basic Skills. Most students learn and retain basic computer concepts only after continuous instruction and repetition. Many basic computer and software skills were continuously repeated by the instructor and practiced by the students many times to assure mastery and understanding. For example, techniques of file management were incorporated throughout the course. File management, a basic but crucial skill, was emphasized by the instructor and practiced by the students during every class session, resulting in hundreds of file management learning opportunities during the semester.

Findings

To determine the change in College of Education students' attitudes toward learning and working with computers after completion of EME 1040, Technology for Educators, t-tests were used to compare the pretest score to the posttest score to formulate the Computer Anxiety Subscale Gain, Computer Confidence Subscale Gain, Computer Liking Subscale Gain, and Computer Usefulness Subscale Gain. Statistically significant differences were found on all subscales. Information is summarized in Table 1.

The results of the t-tests revealed statistically significant differences between the pretest and posttest means on each of the four subscales. The findings indicate that after completion of the course students had less anxiety toward technology. Students' attitudes from the pretest to the posttest revealed statistical significant differences that occurred over the duration of the semester. Students in the College of Education were found to have a more positive attitude toward learning and working with computers after completion of the introduction to educational technology course. College of Education pre-service teachers had lower anxiety, more confidence, and found computers more useful at the end of the semester. An introduction to educational technology course made a difference in these students' attitudes toward computer technology.

Table 1.
Computer Attitude Scale Analysis of Variance Summary Table.

	Mean	t	Significance
Anxiety Subscale	4.91	5.407	.000
Confidence Subscale	3.73	4.490	.000
Liking Subscale	3.59	4.635	.000
Usefulness Subscale	1.61	3.064	.006

N=26 $p < .05$

Students were also asked to reflect on their experiences in the class through quantitative open-ended questions. Students expressed their feelings and perceptions of their experiences during the semester. Each of the following are direct quotes from several student responses. " Before this class I only knew the basics, word processing, and now I am confident I could build a database, spreadsheet, and Hyperstudio project"; "This class has built my confidence with computers!"; "I found myself wanting more and more to use technology in the classroom as a learning tool."; "I learned so much. I can not explain how important this class was for me and how it influenced me."

Conclusions and Recommendations

Analysis revealed a statistically significant change in computer attitudes of students over the semester. The research indicated that the introductory course was successful in significantly reducing the incidence of computer anxiety.

The introductory computer course is fundamental to a student's success with computer technology. Students in many education degree programs are not required to take any computer-related courses. Universities need to require at least one computer literacy course regardless of the student's program of study. Computers have infiltrated every aspect of our lives; therefore, all students should be prepared to enter the work force with adequate computer skills.

Therefore, the researchers concluded that computer anxious students could be taught in a way that could reduce computer anxiety. Thus, the more knowledge students gain

coupled with a positive experience in the classroom the lower their anxiety levels and the more positive their attitudes toward computers.

The researchers suggest the need for further research on computer attitudes in order to prepare students to possess information technology skills required to enter the work force. Whether in education, business, engineer or history, all degree programs need to emphasize the necessity of students possessing high-tech skills to compete in a world class global society. The changing of students' attitude involves persuasion and an understanding of the influences that determine a student's attitude. This study revealed that students continue to enter the university system with low skill levels and high levels of anxiety. From this pilot study, results confirm that how a course is taught can change students attitudes and perceptions of technology. Faculty must address these pre-existing attitudes and encourage and challenge pre-service teachers to not only learn how to use technology but how to integrate technology into their own classroom curriculums.

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